AMENDMENTS TO THE CLAIMS

The attached three sheet of drawings include changes to FIGS. 2, 3 and 5. In FIG. 2, previously omitted reference number 216 has been added. In FIGS. 3 and 5, previously omitted cross hatching has been added.

Attachment: 3 replacement sheets

REMARKS

This is a full and timely response to the Office action mailed January 31, 2006. Claims 1-21 are currently pending in the application. Claims 6, 16 and 20 have been withdrawn. Claims 15 and 19 have been amended. Reexamination and reconsideration in view of foregoing amendments and following remarks is respectfully solicited.

Objections to the Drawings

In the office action, the Examiner objected to the drawings as inconsistent with the specification. Specifically, the Examiner stated that paragraph 0023 describes a reaction wheel structure 216, but that the drawings do not show a reaction wheel structure 216. In response, applicants have attached replacement sheets of drawings that add the reference numeral 216. Applicants thus submit that this objection has been overcome.

In the office action, the Examine objected to the drawings as not showing the proper hatchings in FIGS. 3 and 5. Applicants have attached replacement sheets that add additional cross hatching to these FIGS. Applicants thus submit that this objection has been overcome.

Objections to the Claims

The Examiner has objected to claims 15 and 19 for the phrase "wherein piezodynamic damping spacer comprises". Accordingly, applicants have amended claims 15 and 19 to recite "wherein the piezodynamic damping spacer comprises". Accordingly, applicants submit that the rejection has been overcome.

Rejections under 35 U.S.C. § 102

Claims 1-5, 7, 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by Perni et al (E.P. Patent No. 1,134,443), hereinafter "Perni". Regarding claim 1, the Examiner stated that Perni teaches a damping spacer 22, a the spacer 22 coupled to bearings, in a momentum control device 2, the damping spacer 22 configured such that vibrations in the bearing 10 are absorbed by the piezodynamic damping spacer 22 and converted to electrical energy. The Examiner further stated that Perni disclosed a tuning system electrically coupled to the damping spacer, the tuning system providing selective control of a resonant frequency of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range.

Applicants respectfully disagree, and submit that independent claim 1 is patentably distinct over the cited Perni reference for several reasons. First, claim 1 recites that the piezodynamic damping spacer is coupled to a bearing in a "momentum control device". Applicants submit that Perni fails to teach a momentum control device. The Examiner cites element 2 of FIG. 1 ion Perni as being such a momentum control device. Applicants disagree, and note that element 2 of Perni is described as an actuator device. In contrast, momentum control devices, as described in applicants' specification, are used to provide a torque for attitude control to spacecraft and other vehicles. See applicants' specification at paragraph 0002. Two types of momentum control device are reaction wheels and control moment gyroscopes. See paragraphs 0003 and 0004. As Perni fails to teach the use of a vibration damping device in a momentum control device, it fails to anticipate the claimed invention.

Second, claim 1 recites that the vibration damping device includes a piezodynamic damping spacer "configured such vibrations in the bearing are absorbed by the piezodynamic damping spacer and converted to electrical energy" and a "turning system electrically coupled to the piezodynamic damping spacer, the tuning system providing selective control of a resonant frequency of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range". As described in applicants' specification, such a turning system can be implemented to

optimize absorption of disturbances in specific frequency ranges. See applicants' specification at paragraph 0034 -0041 for several detailed examples.

Applicants submit that Perni fails to teach such a combination of damping spacer and tuning system. Specifically, Perni fails to teach a turning system that provides "selective control of a resonant frequency of the vibration damping device" such that "the vibration damping device absorbs vibrations in a selected frequency range". In the office action, the Examiner cited paragraph 0028 as teaching this feature. Applicants submit that this is incorrect, and that paragraph 0028 instead describes a feedback control system for measuring and adjusting preload. It says nothing about controlling the resonant frequency of the device such that vibrations are absorbed.

Thus, applicants submit that independent claim 1 is patentably distinct over the cited Perni reference. Furthermore, as claims 2-13 depend from, and include all the limitations of independent claim 1, they are also submitted to be patentably distinct.

Claims 1, 9-15, 17-19 and 21 were rejected under 35 U.S.C. § 102(b) as being anticipated by Kudo et al (U.S. Patent No. 6,286,374), hereinafter "Kudo"). Again, applicants respectfully disagree, and submit that independent claims 1, 14 and 18 are patentably distinct over the cited Kudo reference for several reasons. First, claims 1, 14 and 18 each recite that the piezodynamic damping spacer is coupled to a bearing in a "momentum control device". Applicants submit that Kudo fails to teach a momentum control device. The Examiner cites element 100 of Kudo as being such a momentum control device. Applicants disagree, and note that element 100 of Kudo is described as a preload measuring apparatus. In contrast, momentum control devices, as described in applicants' specification, are used to provide a torque for attitude control to spacecraft and other vehicles. As Kudo fails to teach the use of a vibration damping device in a momentum control device, it fails to anticipate the claimed invention recited in independent claims 1, 14 and 18.

Second, claims 1, 14 and 18 recite that the vibration damping device includes a piezodynamic damping spacer, and a tuning the system coupled to the spacer. Claim 1

recites the "tuning system electrically coupled to the piezodynamic damping spacer, the tuning system providing selective control of a resonant frequency of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range". Likewise, claim 13 recites the "tuning system receiving the sensor output and providing selective control of a resonant frequency of the vibration damping device, the tuning system adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations in the measured frequency of the vibrations". Finally, claim 18 recites the "tuning system receiving the sensor data and providing selective control of a resonant frequency of the vibration damping device in response to the sensor data, the tuning system adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations created by the momentum control device at the operational speed". Applicants submit that Kudo fails to teach any such a tuning system.

In making the rejection, the Examiner cited column 6, line 18, to column 10, line 35 and claims 1-14 as teaching such a tuning system. Applicants again disagree. While this section describes resonant frequencies, it is generally referring to the resonant frequency of the bearings. Kudo does not disclose controlling the resonant frequency of the vibration damping device such that vibrations are absorbed. Thus, it does not describe the use of a turning system to control the resonant frequency of the vibration damping device "such that the vibration damping device absorbs vibrations in a selected frequency range" as recited in claim 1. Nor does it teach the turning system "adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations in the measured frequency of the vibrations" as recited in claim 14. Finally, it does not teach the tuning system "adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations created by the momentum control device at the operational speed" as recite in claim 18.

Thus, applicants submit that independent claims 1, 14 and 18 are patentably distinct over the cited Kudo reference. Furthermore, as claims 2-13, 15-17, and 19-21

depend from, and include all the limitations of their respective independent claims, they are also submitted to be patentably distinct.

Furthermore, the dependent claims include many other features not found in the cited references. For example, they do not disclose where the momentum control device comprises a reaction wheel as recited in claim 7. Nor do they disclose where the momentum control device comprises a control moment gyroscope as recited in claim 8.

With regard to claims 9, 17 or 21, the cited references do not disclose the use of an operational amplifier to implement a tunable inductor to provide the selective control of the resonant frequency. Applicants note that the amplifiers of Kudo cited as teaching this feature are not disclosed as implementing any sort of tunable inductor.

In summary, none of the references cited by the Examiner nor any other known prior art, either alone or in combination, disclose the unique combination of features disclosed in applicant's claims presently on file. For this reason, allowance of all of applicant's claims is respectfully solicited.

In the office action, the Examiner provisionally rejected claims 1-5, 7, 8, 14 and 15 as being unpatentable over copending Application No. 10/608,176. Although the Examiner noted that the claims were not identical, the Examiner stated they were not patentably distinct. In supporting this rejection, the Examiner stated that absorbing vibration inherently controls the preload. Applicants strenuously disagree, and note that "tuning system" of the present claims is implemented to provide selective control of a resonant frequency of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range. In contrast, the claims in 10/608,176 describe a control system that provides selective control of the preload on the bearings, with no mention of vibration. Applicants submit that such a completely different purpose and implementation are patentably distinct. Furthermore, applicants note that the Examiner has provided no evidence to support the statement that absorbing vibration inherently controls the preload.

Conclusion

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

If for some reason Applicant has not paid a sufficient fee for this response, please consider this as authorization to charge Ingrassia, Fisher & Lorenz, Deposit Account No. 50-2091 for any fee which may be due. This authorization is intended to act as a constructive petition for an extension of time, should an extension of time be needed as a result of this response.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

Dated: 1 May 2006

By: _____

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